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5 PAGES OF ENCLOSURE 1.

Entergy

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Michael A. Krupa
Director
Nuclear Safety & Licensing

CNRO-2003-00047

September 25, 2003

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Entergy Operations, Inc.
Relaxation Request to NRC Order EA-03-009 for Control Element Drive Mechanism Nozzles

Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

REFERENCE: Entergy Operations, Inc. letter CNRO-2003-00033 to the NRC, "Relaxation Request to NRC Order EA-03-009," dated August 27, 2003

Dear Sir or Madam:

In the referenced letter, Entergy Operations, Inc. (Entergy) requested relaxation from Section IV.C(1)(b) of NRC Order EA-03-009 for Arkansas Nuclear One, Unit 2 (ANO-2) via ANO-2 Relaxation Request #1 pertaining to the control element drive mechanism (CEDM) nozzles.

Since submitting Relaxation Request #1, Entergy has discovered typographical errors in the request and in the supporting Engineering Report M-EP-2003-002, Rev. 1. Specifically, Table 2 of Relaxation Request #1 was mislabeled and Figures 8 through 11 and 15 of the engineering report contained mislabeled reference lines. These corrections do not impact any technical information or conclusions of the report. A corrected table and corrected figures are provided in Enclosure 1. These supercede the previous table and figures.

In a recent telephone conversation with Entergy representatives discussing ANO-2 Relaxation Request #1, the NRC staff requested that Entergy provide information regarding the eddy current testing (ECT) instrumentation to be utilized in the augmented inspections of the CEDM nozzle blind zone area. This information is provided in Enclosure 2.

This letter contains no new commitments.

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If you have any questions or require additional information, please contact Guy Davant at (601) 368-5756.

Sincerely,

M. A Krupa

MAK/GHD/bal

Enclosure: 1. Corrected Table and Figures
2. Eddy Current Testing Instrumentation

cc: Mr. C. G. Anderson (ANO)
Mr. W. A. Eaton (ECH)
Mr. G. A. Williams (ECH)

Mr. T. W. Alexion, NRR Project Manager (ANO-2)
Mr. R. L. Bywater, NRC Senior Resident Inspector (ANO)
Mr. B. S. Mallett, NRC Region IV Regional Administrator

ENCLOSURE 1

CNRO-2003-00047

CORRECTED TABLE AND FIGURES

TABLE 2

Industry History of Known Cracking for Heats of Alloy 600 Material Used in Combustion Engineering CEDM Nozzles

Plant	Nozzle Function	Heat	Form	Supplier	Inspection Date	Inspection Type	Total Number of Nozzles	Nozzles With Cracks
Plant A	CEDM	A6785	SB-166	Standard Steel	Spring 2003	100% UT	9	1 of 9 Cracked
Plant A	CEDM	E03045	SB-166	Standard Steel	Spring 2003	100% UT	35	1 of 35 Cracked
Plant B	CEDM	NX1045	SB-167	Huntington Alloy	Not Known	100% UT	3	3 of 58 Cracked

Row	Height	ID	25%	50%	75%	OD
1	0.000	-25.088	-27.546	-27.787	-25.624	-23.763
101	0.485	-0.56305	-0.53856	-2.1108	-4.851	-6.1565
201	0.874	21.515	18.635	17.122	14.843	10.089
301	1.186	32.751	28.494	24.136	19.645	14.45
401	1.436	35.667	29.598	26.166	25.589	28.417
501	1.635	34.244	29.574	28.286	35.408	45.379
601	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
701	1.932	23.674	26.502	33.261	47.609	64.65
801	2.068	18.928	24.564	33.968	49.071	65.876
901	2.204	16.541	22.854	34.789	49.525	62.795
1001	2.341	17.561	22.683	33.806	47.49	63.558
1101	2.477	22.026	23.229	32.421	44.118	58.478
1201	2.613	26.382	25.611	31.17	41.606	52.552
1301	2.750	30.043	28.69	33.688	38.959	45.295
1401	2.886	33.132	31.073	37.166	43.676	36.261

Table 1: *Nodal stress for 0° nozzle. This nozzle is symmetric about the nozzle axis hence these stresses prevail over the entire circumference. The weld location is shown by the shaded row.*

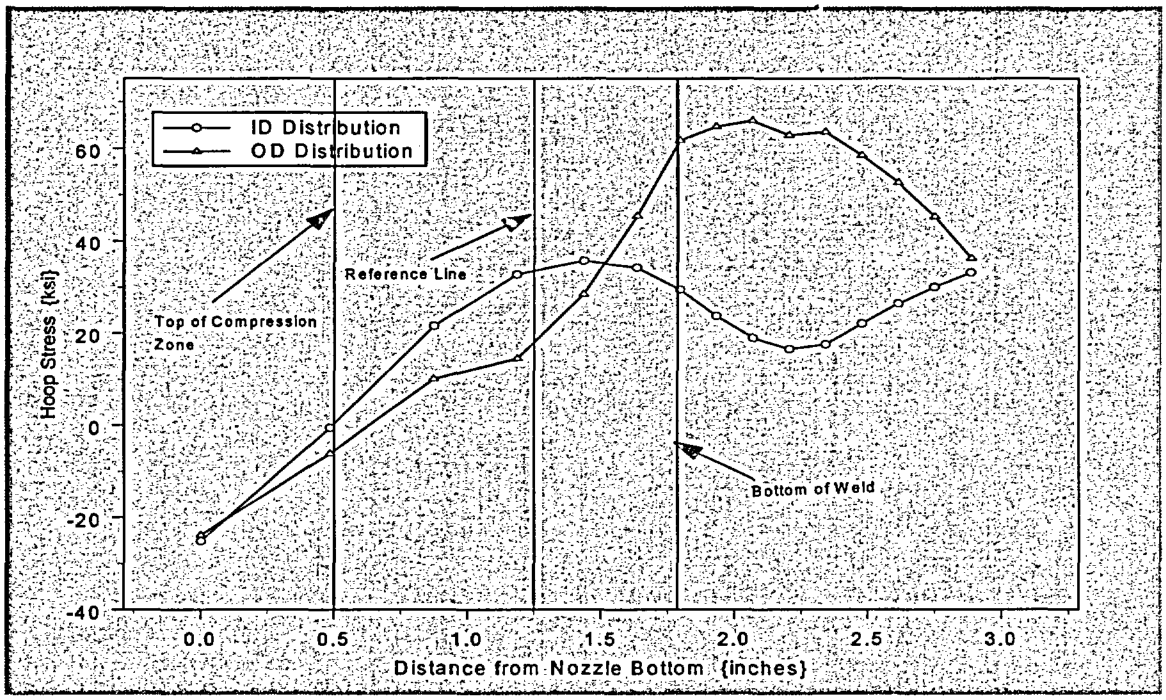


Figure 8: *Plot showing hoop stress distribution along tube axis for the 0° nozzle. The top of compressive zone, the reference line, and the bottom of the weld are shown.*

Row	Height	ID	25%	50%	75%	OD
1	0.000	-27.404	-24.356	-22.209	-20.407	-18.978
101	0.483	0.63328	-1.486	-3.5987	-4.4402	-5.2679
201	0.870	17.665	16.422	14.61	12.415	9.3756
301	1.180	29.798	26.049	22.723	18.95	14.201
401	1.428	33.623	27.792	24.8	24.321	26.989
501	1.627	32.364	28.469	27.591	34.284	45.104
601	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
701	1.919	21.498	25.556	33.55	48.089	66.365
801	2.051	16.944	23.793	34.064	49.472	67.672
901	2.183	14.834	22.263	34.779	49.055	63.377
1001	2.315	15.852	21.898	33.764	46.61	61.537
1101	2.448	20.835	22.531	32.095	42.501	53.972
1201	2.580	25.973	25.072	30.748	39.365	47.486
1301	2.712	29.955	28.372	32.593	36.879	39.934
1401	2.844	33.46	31.26	36.351	41.573	31.302

Table 2: *Nodal stress for 8.8° nozzle at the downhill location. The weld location is shown by the shaded row.*

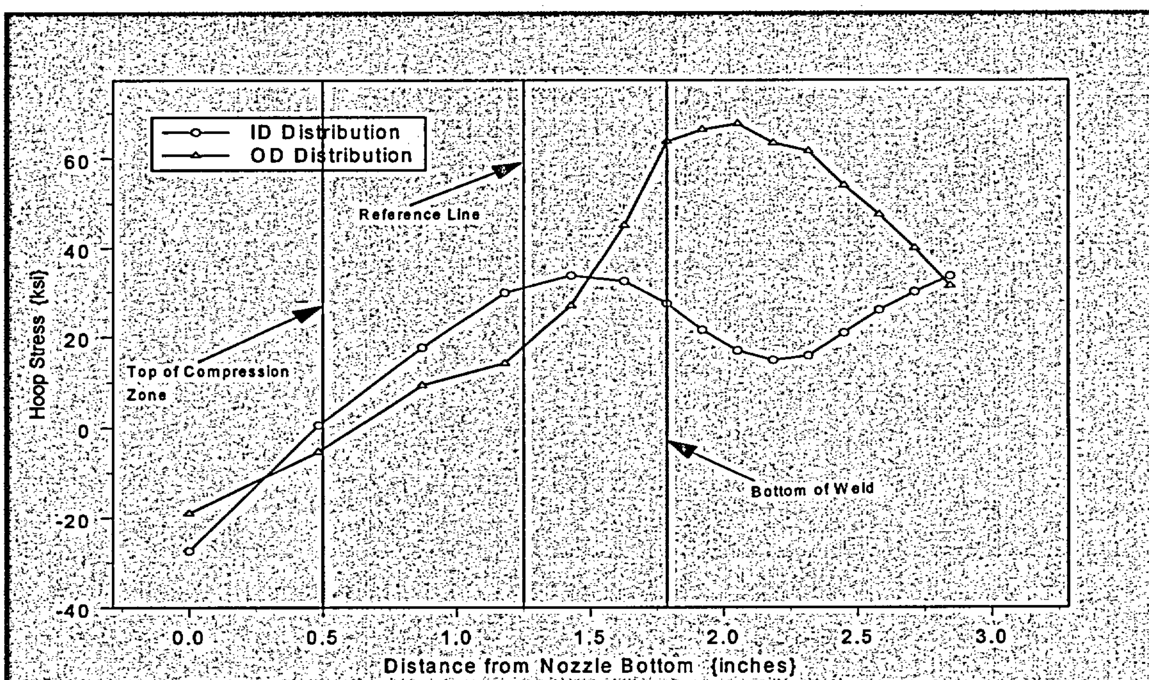


Figure 9: *Plot showing hoop stress distribution along tube axis for the 8.8° nozzle at the downhill location. The top of compressive zone, reference line, and the bottom of the weld are shown.*

Row	Height	ID	25%	50%	75%	OD
10001	0	-27.118	-24.146	-22.087	-20.358	-18.981
10101	0.48843	0.64978	-1.526	-3.6985	-4.5989	-5.4683
10201	0.87972	17.955	16.435	14.447	12.118	8.9948
10301	1.1932	29.829	26.102	22.672	18.714	13.833
10401	1.4443	33.679	27.823	24.722	24.104	26.541
10501	1.6[illegible]	32.389	28.385	27.447	34.121	44.818
10601	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10701	1.9403	21.477	25.458	33.3	47.738	65.934
10801	2.074	16.919	23.701	33.846	49.217	67.244
10901	2.2076	14.769	22.095	34.557	48.869	62.964
11001	2.3413	15.756	21.725	33.561	46.369	61.153
11101	2.4749	20.717	22.317	31.908	42.308	53.889
11201	2.6085	25.789	24.923	30.579	39.284	47.365
11301	2.7422	29.737	28.248	32.847	37.236	40.412
11401	2.8758	33.001	30.843	35.887	41.552	34.5

Table 3: *Nodal stress for 8.8° nozzle at 22.5° rotated from the downhill location. The weld location is shown by the shaded row.*

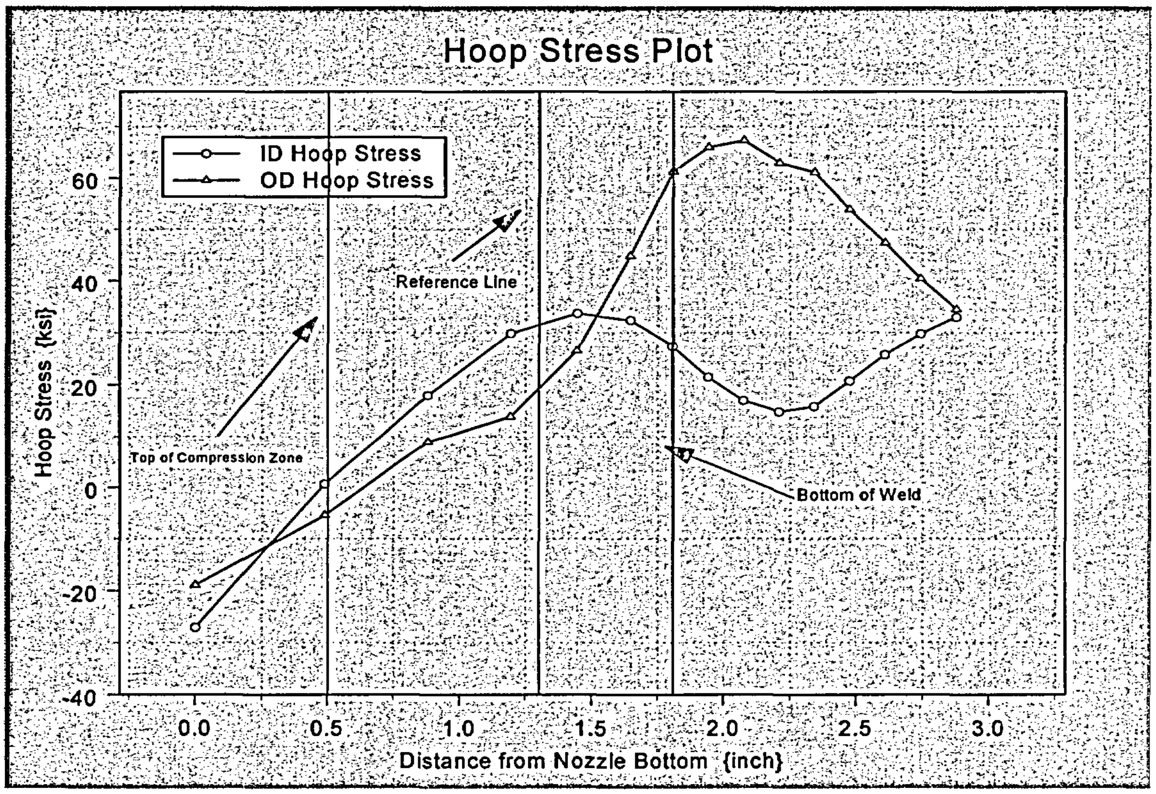


Figure 10: *Plot showing hoop stress distribution along tube axis for the 8.8° nozzle at 22.5° rotated from the downhill location. The top of compressive zone, reference line, and the bottom of the weld are shown.*

Row	Height	ID	25%	50%	75%	OD
20001	0	-26.311	-23.544	-21.718	-20.18	-18.943
20101	0.50592	-0.3769	-2.2224	-3.9683	-5.0362	-6.0278
20201	0.91123	20.089	16.851	14.017	11.337	7.9165
20301	1.2359	29.934	26.239	22.486	18.067	12.788
20401	1.4961	33.829	27.906	24.526	23.554	25.421
20501	1.7045	32.487	28.206	27.053	33.58	44.169
20601	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	60.214
20701	2.0063	21.433	25.168	32.645	46.971	64.949
20801	2.1413	16.793	23.322	33.237	48.59	66.19
20901	2.2762	14.561	21.627	33.983	48.342	62.067
21001	2.4111	15.505	21.303	33.027	45.936	60.887
21101	2.5461	20.329	21.914	31.51	42.056	54.174
21201	2.681	25.223	24.532	30.274	39.283	47.704
21301	2.8159	29.209	27.786	32.709	37.408	41.335
21401	2.9509	32.564	30.324	35.521	41.82	35.243

Table 4: *Nodal stress for 8.8° nozzle at 45° rotated from the downhill location. The weld location is shown by the shaded row.*

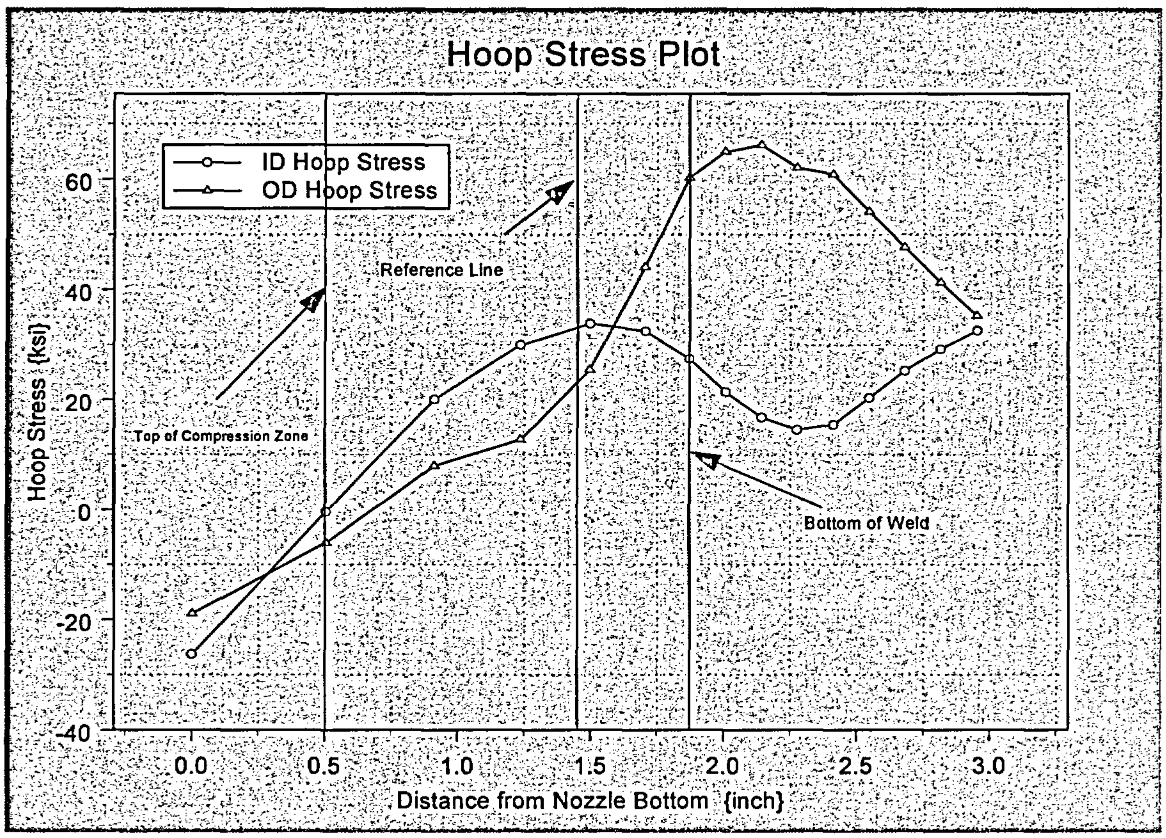


Figure 11: *Plot showing hoop stress distribution along tube axis for the 8.8° nozzle at 45° rotated from the downhill location. The top of compressive zone, reference line, and the bottom of the weld are shown.*

Row	Height	ID	25%	50%	75%	OD
1	0.000	-17.414	-13.552	-11.113	-8.8843	-6.6283
101	0.461	-8.4943	-6.31	-4.924	-3.7058	-2.5412
201	0.830	0.088906	0.17947	0.11003	0.18625	0.2839
301	1.126	7.0251	6.9534	6.3144	5.2078	4.6462
401	1.363	8.2154	10.954	10.85	9.5121	5.6465
501	1.552	13.266	16.41	16.061	17.131	25.256
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
701	1.825	29.036	28.83	31.285	53.547	64.082
801	1.946	33.945	30.929	36.407	61.6	71.01
901	2.066	29.591	31.788	40.536	64.612	76.418
1001	2.187	23.26	29.738	41.2	64.193	79.626
1101	2.308	18.689	27.734	41.29	61.777	78.117
1201	2.428	15.391	26.097	40.668	58.596	72.784
1301	2.549	14.546	24.118	39.369	54.107	62.074
1401	2.670	16.833	23.402	37.135	47.479	45.328
1501	2.790	22.94	24.557	33.686	39.867	31.733
1601	2.911	30.347	28.824	34.637	35.903	24.215
1701	3.032	36.319	33.178	37.13	37.761	22.663
1801	3.152	40.587	36.14	41.105	36.249	-4.0021

Table 8: *Nodal stress for 28.8° nozzle at downhill location. The weld location is shown by the shaded row.*

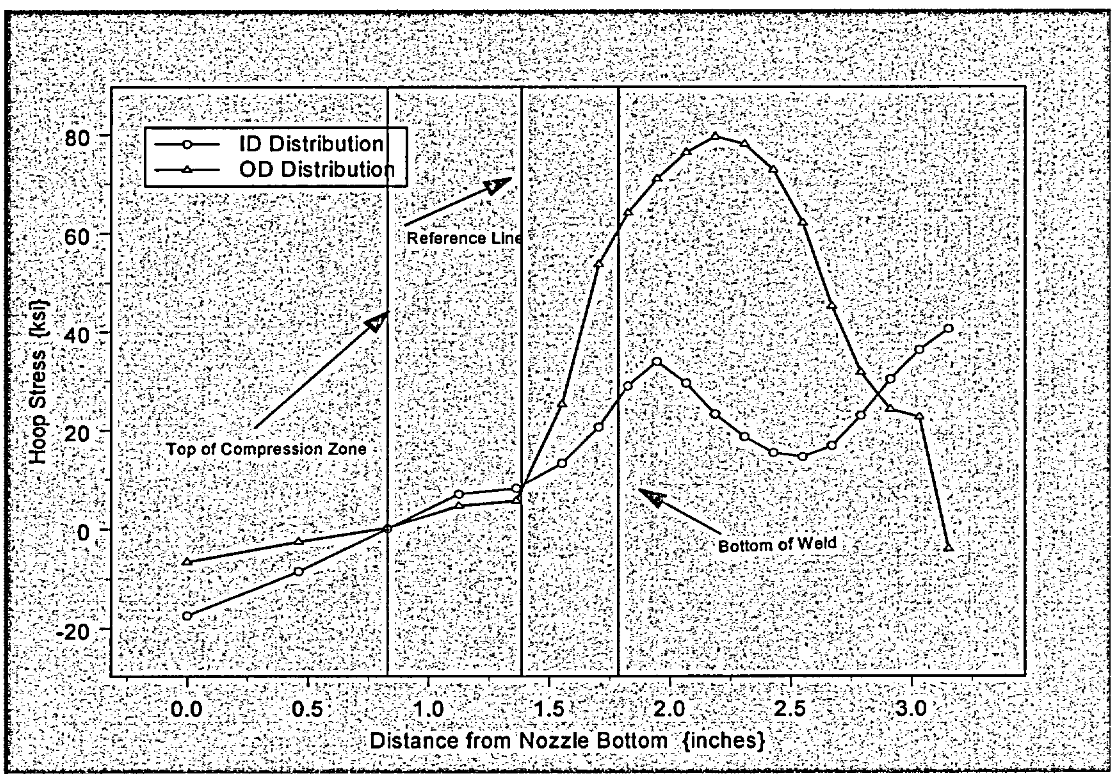


Figure 15: *Plot showing hoop stress distribution along tube axis for the 28.8° nozzle at downhill location. The top of compressive zone, reference line, and the bottom of the weld are shown.*

ENCLOSURE 2

CNRO-2003-00047

EDDY CURRENT TESTING INSTRUMENTATION

EDDY CURRENT TESTING INSTRUMENTATION

The portions of the ANO-2 control element drive mechanism (CEDM) nozzles that will be subjected to augmented inspections are addressed in Section IV.B.2 of ANO-2 Relaxation Request #1 (Enclosure 1 of Entergy letter CNRO-2003-00033). The top of the augmented inspection zone is defined as the upper limit of the blind zone (i.e., 1.544 inches above the bottom of the nozzle). The bottom and circumferential extent of the blind zone were established by fracture mechanics analysis. The bottom of the augmented inspection zone was determined by identifying a point at the downhill (0°) azimuthal location from which a crack could not propagate into the weld region within one cycle of operation. Likewise, the circumferential extent of the augmented inspection zone was determined by identifying a point along the upper limit of the blind zone from which a crack could not propagate into the weld in one cycle of operation. Based on this evaluation, the minimum augmented inspection zone boundaries were defined as shown in the table below.

CEDM Location	Nozzle Azimuth Location	Boundary for Augmented Surface Examination			
		Top Elevation	Bottom Elevation	Axial Length	Circumferential Extent
0°	Downhill	1.544"	1.090"	0.454"	DH ± 180°
8.8°	Downhill	1.544"	1.090"	0.454"	DH ± 67.5°
28.8°	Downhill	1.544"	1.224"	0.320"	DH ± 22.5°
49.6°	Downhill	1.544"	0.883"	0.661"	DH ± 45°

Entergy intends to use the eddy current testing (ECT) method as the primary surface examination method for augmented inspections of the CEDM nozzles. Entergy recognizes the NRC staff's expectation that inspections be performed to the maximum extent possible. Accordingly, Entergy intends to meet these expectations as described below.

ECT inspection equipment was specifically designed by Westinghouse to perform the required augmented inspections of the CEDM nozzles. The design objectives for the equipment were:

1. Inspection coverage bounds the portion of the blind zone identified by analysis.

2. The equipment can be consistently applied to all CEDM nozzle locations.

3. The equipment setup and operation minimizes radiation exposure.

4. The equipment setup and operation minimizes operator error.

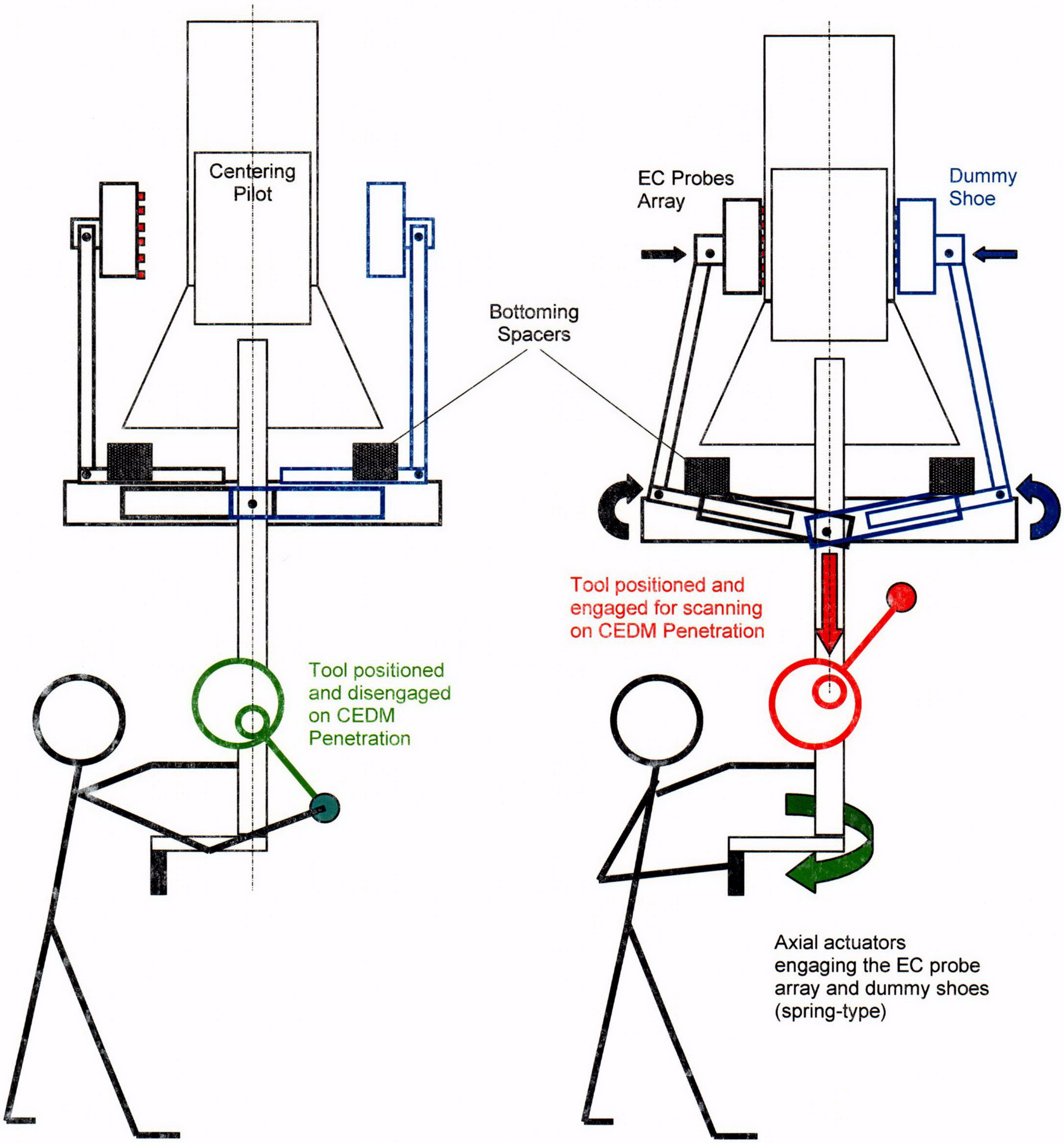
The ECT inspection tool (sled) is designed with an array of transducer coils that allow a single scan to be performed without multiple setups. A one-inch scan length was chosen to envelop the areas identified by analysis (maximum axial length of 0.661 inch) and to prevent interference issues associated with the guide cones and steep angles on the outer nozzle rows. The scan length is fixed by the design of the inspection tool and the size of the ECT coil block. The position of the ECT coil block is fixed relative to the vertical axis of the nozzle.

The ECT inspection equipment is manually installed on each CEDM nozzle and manually operated via hand cranks. The ECT equipment inspects the nozzle from 0.2 inch above to 0.8 inch below the top of blind zone. This one-inch inspection band width exceeds the requirements of the analysis. Entergy does not have any inspection equipment that is capable of inspecting below this range. In particular, while the table above indicates an axial length to be inspected ranging from 0.320 inch to 0.661 inch below the top of the blind zone, Entergy will be inspecting an axial length of 0.8 inch below the top of the blind zone.

See Figure 1 for a conceptual sketch of the ECT instrumentation and delivery system.

FIGURE 1

ECT INSPECTION TOOL FOR CEDM NOZZLE BLIND ZONE



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